Allora $\begin{cases} g'(x) = \dfrac{x^2-2x}{(x-1)^2} & \text{se } x \in ]-\infty, 2[ \setminus \{1\} \\ g'(x) = \dfrac{x}{\sqrt{x^2-4}} & \text{se } x > 2 \end{cases}$

a) $\lim_{x \to +\infty} \left(\sqrt{x^2-4}+3\right) - x$

$= \lim_{x \to +\infty} \sqrt{x^2-4} - x + 3$

$= \lim_{x \to +\infty} \dfrac{(\sqrt{x^2-4}-x)(\sqrt{x^2-4}+x)}{\sqrt{x^2-4}+x} + 3$

$= \lim_{x \to +\infty} \dfrac{-4}{\sqrt{x^2-4}+x} + 3$

$= \lim_{+\infty} \dfrac{-4}{\sqrt{x^2-4}+x} + 3 = 3$

$\lim_{x \to +\infty} \left(\sqrt{x^2-4}+3\right) - (x+3) =$

$\lim_{x \to +\infty} \underbrace{\left(\sqrt{x^2-4}+3-x\right)}_{3} + 3 = 0$